Highlights

Vol. II No. 3
April 6, 1959

* SPACE COMMUNICATIONS
* AIRCRAFT SHELTERS
* CIVIL DEFENSE RESEARCH
* ATOMIC RESEARCH CONTRACTS
* RESEARCH CHECKLIST
* PUBLICATION CHECKLIST

Washington SCIENCE TRENDS

SPACE COMMUNICATIONS NETWORK

National Aeronautics and Space Administration and Department of Defense have quietly reached agreement on a civilian-military global network of large tracking and communications centers for future deep space experiments and manned satellite flights. New military facilities planned for Spain and Japan or another Far Eastern site are soon to be announced.

* Communications agreement: Defense Secretary Neil H. McElroy and NASA Administrator T. Keith Glennan signed agreement earlier this year. It calls for "immediate and vigorous" action in construction of new global tracking, data acquisition, communications and data center construction.

* Military program: No announcement was made, but Congress was informed that the Defense Department intends to ship a large and powerful 85 foot radio telescope to Spain for deep space work and broad band data readout. A large, high-capacity acquisition antenna is being planned for Japan or some other Far East site still to be determined. Both stations will be operated by the Department of Defense at existing U.S. military installations, presumably in connection with military space experiments.

* Civilian program: Another 85-foot "dish" will be employed by NASA in connection with its "civilian" space programs. Equipment will be used at one of new data acquisition and tracking stations planned for Woomera, Australia and a location in South Africa. In the "near future" Department of Defense will also require high-capacity data acquisition equipment at both sites. Major installation is being planned for early tracking of Project Mercury manned satellite to be launched northeast from Cape Canaveral, Fla. This will require extensive equipment at Bermuda. Site there will also track missiles and satellites launched from Wallops Island, Va.

AIRCRAFT DISPERSAL TEST

Tactical Air Command plans to build and test a bomb-resistant missile-type launching structure for its F-100 fighter planes stationed overseas. Zero-length, catapult-type launchers would be used in coordination with JATO jet assist take off equipment to have fighters airborne "within seconds" following alert.

Shelter would be designed to resist anything but a direct nuclear strike and would be equipped with filtering devices to assure operation in areas of radioactive contamination. Tactical Air Command believes such "hardened" structures would permit increased fighter dispersal and attack survival.

SPECIAL REPORT -- CIVIL DEFENSE RESEARCH

Office of Civil and Defense Mobilization is spending more than $3,500,000 this year in seeking means to apply science to the problems of Civil Defense. Major programs are often carried forward in cooperation with industry. Programs include radiological defense, shelter studies, warning and communications, health and medical care studies and economic and operations research.

Here, from official OCDM sources, is a summary of major "hardware" programs:

Radiological Defense

* Radiation Physics -- National Bureau of Standards reports "good progress" on studies for OCDM on characteristics of radiation produced by nuclear weapons, penetrability of radiation in various construction materials and buildings, and methods of protecting the public from penetration radiation.

* Shielding Evaluation -- Agency engaged Technical Operations, Inc., Burlington, Mass., to evaluate radiation shielding provided by large structures. A similar project, conducted by the University of California, indicates that it will be possible to evaluate shielding provided in large complex buildings by making only a few physical measurements.

* Radiological Reclamation -- Navy Radiological Defense laboratory is studying, for OCDM, feasibility of various large-scale reclamation procedures including possible decontamination of large military, industrial and residental areas.

* Instruments -- First production models of a new aerial radiological survey instrument are expected later this year. Development has reached prototype stage on a transistorized model of a low-range survey meter, and a remote monitoring fixed station instrument which will permit a person to read outside radiation levels while remaining in a protected location. Agency authorized Jordan Electronics Division of Victoreen Instrument Co. to begin work on a transistorized loudspeaker for a Geiger survey meter. The speaker attachment will be used as a teaching aid for classroom instruction.

* Operational Planning -- Agency is sponsoring studies on variations in fallout distribution, effects of mass fire on fallout, effects of fallout on water resources and possible model state and local radiological defense plans. A method was developed for computing and preparing maps showing contour lines of fallout radiation intensities and doses estimated for various locations on the basis of probable wind patterns and characteristics.

Shelter Studies

* Design studies -- OCDM contracted with Eberle M. Smith Associates Inc. of Detroit for design of three dual purpose fallout shelters for elementary schools. Armour Research Foundation, Chicago, is studying geological formations and other factors affecting possible use of deep rock shelters below such cities as Chicago, New York, Pittsburgh, Detroit, Kansas City and Cleveland.

* Equipment Studies -- Valves designed by Arthur D. Little Inc. of Cambridge, Mass. for opening and closing ventilating intake and exhaust systems in shelters are undergoing test and study. OCDM hopes to obtain valves which are strong enough to withstand nuclear blast and yet flexible enough for rapid operation.

Warning and Communications Research

* Telephone Warning System -- OCDM found through field tests that a proposed system for transmitting a warning from a telephone exchange to all subscribers is not "economically feasible."

* Powerline Warning System -- Midwest Research Institute of Kansas City, Mo. is developing a National Emergency Alarm Repeater powerline warning system which can transmit a nationwide warning to users of electric power who have a special warning receiver. Field tests are underway on a large power network to determine best methods for generating a warning signal. Officials hope to develop a reliable inexpensive receiver that may be plugged into any ordinary 110-volt alternating current outlet.

* Communications -- Research and preliminary studies are continuing on various types of communications equipment, including a mobile communications center, antenna systems, control center communication systems, radio and television broadcast coverage analysis and communications equipment for shelters.

Health and Medical Care Studies

* Studies are continuing on biological effects of blast and fallout. Army Engineering Research and Development Laboratories are studying procedures for removing nerve gas from water by using the facilities and chemicals available in conventional municipal water treatment plants. Investigations by the Army Medical Corps and the National Academy of Sciences are directed toward development of additional plasma volume expanders and methods of processing whole blood plasma.

Operations Research

* Damage Assessment -- Work at Stanford Research Institute is aimed toward revision of the Agency's Damage Assessment System so that it can be used in high-speed electronic computers.

* Strategic Framework Study -- Stanford has also been studying the relative offensive and defensive capabilities of Russia and the United States. As an outgrowth of this project, an analysis has been developed for the Federal Government, of the survival of the population after a massive attack in 1965.

ATOMIC RESEARCH CONTRACTS

Atomic Energy Commissioner John F. Floberg predicts the AEC will stress continuity of research projects in the future rather than increasing the total number of long-term programs. Concern is growing over the practice of making such contracts dependent on Congressional whims each year, in atomic energy or other fields.

AEC now plans research programs on a three-year basis, even if they cannot legally be financed over the long term. Floberg points out that contracts are rarely terminated in less than one year plus a one year "closeout" period. Division of Medicine and Biology hopes to go into five-year programs in the near future.

RESEARCH CHECKLIST

( ) Satellite Control Research: Theoretical studies by the National Aeronautics and Space Administration indicate weight advantages for two or three major proposed systems for use in changing the attitude of a satellite. Research tends to show that an inertia-wheel system offers weight-saving possibilities if a large number of cycles of operation are required. A jet reaction system would be preferred for a limited number of cycles. Research also included possible use of a magnetic bar which interacts with the magnetic field of the Earth.

(Report available. Free. Write Technical Information Office, NASA, 1520 H Street, N.W., Washington 25, D.C. for NASA Memo 12-30-58L)

( ) Titanium Research: Investigators at the Wright Air Development Center have developed a method for determination of oxygen in titanium and other metals. For the project, gravimetric bromination equipment was adapted for use with the conductometric carbon dioxide determinator. Ease and accuracy of measurement are said to be improved.

( ) Shock - Vibration Research: Investigators at the Naval Research Laboratory have developed instrumentation to be used in the measurement of shock and vibration. Project includes studies of the properties of metals suitable for bonded-wire gage construction. Work is being extended to include the effects of impurities and lattice imperfections on the thermoelectric potentials of metals.

(Research by Mechanics and Metallurgy Divisions, Shock and Vibrations and Metal Physics Branches, U.S. Naval Research Laboratory, Washington 25, D.C.)

( ) Homogeneous Power Reactor: Production of superheated steam in one "simple" operation is currently being tested in a homogeneous power reactor operated experimentally at the Los Alamos, New Mex. AEC laboratory. The system uses a solution of enriched uranium phosphate, phosphoric acid and water as fuel, relying on natural circulation of the solution to carry the heat to the heat exchanger where steam is produced.

( ) Hydrogen Isotope Research: Researchers at the National Bureau of Standards, Boulder, Colo., believe it is now feasible to produce large quantitites of deuterium with a newly developed cyrogenic distillation method. The system is said to be particularly well-suited for industrial areas where extensive supplies of hydrogen gas are available -- near ammonium plants. The Bureau's pilot plant for distillation of liquid hydrogen by fractionation has already yielded specific amounts of pure liquid deuterium and deuterium-free hydrogen. Operation of the unit is said to open the way for the use of cyrogenic techniques in solving many other problems in gas separation.

(Report available. Free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Tech Report No. 2358)

( ) Stress-Corrosion Cracking: Studies at the National Bureau of Standards are directed toward a clearer understanding of the mechanism of stress-corrosion cracking, a problem in production of brass articles, riveted steel boilers and in "leaking" stainless steel equipment. Experiments with a magnesium alloy indicate that stress-corrosion cracking is primarily an electrochemical process which can be halted with cathodic protection.

(Report available. Free. Write Office of Technical Information, National Bureau of Standards, Washington 25, D.C. for Summary Technical Report No. 2300)

( ) Radio Transmission Research: Naval Research Laboratory and Cook Research Laboratories are cooperatively investigating possible use of an acoustic sounder to determine detailed local weather conditions. A high-power transducer sends a pulse of acoustic energy upward. Return of this pulse to an audio receiver is investigated for correlation with measured conditions aloft.

(Research By Electronics Division, Wave Propagation Branch, U.S. Naval Research Laboratory, Washington 25, D.C.)

( ) Propulsion "Gun" Research: A reaction "gun" for use under zero-gravity space flight conditions is under development at Wright Air Development Center. Present equipment consists of a package of high-pressure air bottles, a short length of hose, a nozzle and valves for controlling amount and direction of air discharged. Reaction of the high-pressure air propels human subject from one point to the other in a "weightless" environment.

(Research by Crew Stations Research Section, Aero Medical Laboratory, WADC, Dayton, Ohio)

( ) Plastics Research: Basic research at the National Bureau of Standards has led to new findings on the degradation mechanism of poly (vinyl chloride) which is used in products ranging from garden hoses to packaging materials and protective coatings. It also has many applications in military hardware items and equipment. Experimental work indicates that the polymer degrades by a free radical mechanism in which hydrogen chloride is stripped from the polymer chain.

(Report available. Free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Technical Report No. 2320)

( ) Sheet Metal Testing: A modified bend test to measure uniformity in sheet metal ductility has been developed at the U.S. Army Watertown (N.Y.) Arsenal. Method is said to permit greater sensitivity, convenient operation and conservation of test material.

(Report available. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 131 947. 6 pages. 50 cents)

PUBLICATIONS CHECKLIST

( ) Atomic Energy Cooperation, a compilation of materials, including some published for the first time, on problems and opportunities in Federal-State cooperation in the atomic energy field. Includes draft version of AEC proposed legislation, and analysis. 520 pages. Free. (Write Joint Committee on Atomic Energy, F-88, The Capitol, Washington 25, D.C.)

( ) Government Science Positions, a new illustrated brochure outlining employment opportunities for electronic scientists, metallurgists, engineers and physicists with the Army Ordnance Missile Command. 20 pages. Free. (Write Executive Secretary, Board of Civil Service Examiners, Redstone Arsenal, Alabama)

( ) Science Training, a brief summary, newly prepared, of data on the training of scientists and engineers in the U.S. 11 pages. Free. (Write Information Office, National Science Foundation, Washington 25, D.C. for NSF 59-15)

( ) Data Processing Occupations, a pamphlet prepared by the U.S. Department of Labor describing 13 new occupations in the field of electronic data processing systems ranging from coding clerk to computer analyst. Includes a brief explanation of data processing and a glossary of terms. (Write Information Office, Bureau of Employment Security, U.S. Department of Labor, Washington 25, D.C.)

( ) Aluminum, a comprehensive report on the operation of an experimental plant at Laramie, Wyoming, for testing the feasibility of producing alumina from aluminum silicate minerals. 127 pages. $1. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Bureau of Mines Bulletin No. 577)

( ) Gas Composition, a description of a gravimetric method for determining the composition of various gaseous mixtures and apparatus used. 12 pages. Free. (Write Publications Distribution Section, U.S. Bureau of Mines, 4800 Forbes St. Pittsburgh 13, Pa. for Report of Investigation 5452)

( ) Aluminum Alloys, a loose-leaf handbook on the material properties of such alloys prepared by the Royal Aeronautical Society for use in NATO nations. Free. (Write Technical Information, National Aeronautics and Space Administration, 1520 H Street, N.W., Washington 25, D.C. for Publication N-68112 v.I)

( ) Defense Appropriations, testimony, statements and reports by Defense Department officials on the new military budget. Includes details of many research -development -procurement programs. 1017 pages. Free as available. (Write Committee on Appropriations, House of Representatives, The Capitol, Washington 25, D.C. for Part I, Defense Appropriations Hearings)

( ) Hypersonic Vehicles, a newly declassified discussion of problems of performance and heating of ballistic rockets, skip rockets and particularly rocket gliders. 20 pages. Free. (Write National Aeronautics and Space Administration, Technical Information, 1520 H Street, N.W., Washington 25, D.C. for NACA RM E 51L07)